PROPIONALDEHYDE

Propionaldehyde is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 123-38-6 C_2H_5CHO

Molecular Formula: C_3H_6O

Propionaldehyde is a flammable, colorless liquid with an unpleasant, suffocating, fruity odor similar to acetaldehyde. It is miscible with alcohol, ether, chloroform, and water (HSDB, 1991). It reacts vigorously with oxidizers and polymerizes with addition of methyl methacrylate (Sax, 1989).

Physical Properties of Propionaldehyde

Synonyms: methylacetaldehyde; propanal; propionic aldehyde; propyl aldehyde

Molecular Weight:	58.08
Boiling Point:	49 ^oC
Melting Point:	-81 ^oC
Vapor Density:	1.8 (air = 1)
Density/Specific Gravity:	0.807 at 20/4 ^oC (water = 1)
Vapor Pressure:	687 mm Hg at 45 ^oC
Flash Point:	15 - 19 ^oF
Conversion Factor:	1 ppm = 2.37 mg/m^3

(Merck, 1989; Sax, 1989; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

Propionaldehyde is a chemical intermediate for propionic acid, trimethylolethane and n-propyl alcohol. It is used as a synthetic flavoring adjuvant in non-alcoholic beverages and food. Other uses include disinfectants, as a preservative, and in agricultural chemical preparations (Sax, 1987; HSDB, 1991). Propionaldehyde is emitted from manufacturing facilities, municipal waste incinerators, and from the combustion of wood, gasoline, diesel fuel, and polyethylenes (HSDB, 1991).

The primary stationary sources that have reported emissions of propionaldehyde in California are lumber and wood products manufacturers, and electrical services (ARB, 1997b). Propionaldehyde has also been detected but not quantified in motor vehicle exhaust by the Air Resources Board (ARB) (ARB, 1995e).

B. Emissions

The total emissions of propionaldehyde from stationary sources in California are estimated to be at least 4,900 pounds per year, based on data reported under the Air Toxics "Hot Spots" Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

Propionaldehyde has been found in apple aroma and in essential oils of camphor, rosa centrifolia, clary sage, Pinus excelsa, and Pinus silvestris (HSDB, 1991).

AMBIENT CONCENTRATIONS

No ARB data exist for ambient measurements of propionaldehyde. However, the United States Environmental Protection Agency (U.S. EPA) has compiled ambient air data from 17 urban to suburban locations throughout the United States from 1974-80. An overall mean ambient air concentration of 9.98 micrograms per cubic meter was reported (U.S. EPA, 1993a).

INDOOR SOURCES AND CONCENTRATIONS

No information about the indoor sources and concentrations of propionaldehyde was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

Propionaldehyde exists in the atmosphere in the gas phase. The dominant atmospheric loss process for propionaldehyde is by reaction with the hydroxyl radical. Based on this reaction, the atmospheric half-life and lifetime of propionaldehyde is estimated to be 12 hours and 18 hours, respectively (Atkinson, 1994). The reaction products of this reaction include acetaldehyde, formaldehyde, and peroxypropionyl nitrate (Atkinson, 1995).

AB 2588 RISK ASSESSMENT INFORMATION

Although propionaldehyde is reported as being emitted in California from stationary sources no health values (cancer or non-cancer) are listed in the California Air Pollution Control Officers Association Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines for use in

risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

Probable routes of human exposure to propionaldehyde are inhalation and ingestion (U.S. EPA, 1994a).

Non-Cancer: Exposure to propionaldehyde may cause eye and respiratory tract irritation. Acute exposure to very high levels causes lethal pulmonary edema in animals. Exposure to high levels of propionaldehyde by inhalation has been shown to result in anesthesia and liver damage in animal studies (U.S. EPA, 1994a).

The U.S. EPA has the Reference Concentration (RfC) under review and has not established an oral Reference Dose (RfD) for propionaldehyde. No information is available on adverse developmental or reproductive effects of propionaldehyde in humans or animals (U.S. EPA, 1994a).

Cancer: No information is available on the carcinogenic effects of propionaldehyde in humans or animals (U.S. EPA, 1994). The International Agency for Research on Cancer and the U.S. EPA have not classified propionaldehyde with respect to potential carcinogenicity (IARC, 1987a; U.S. EPA, 1994a).